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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/646,572
Filing Date: August 23, 2003
Appellant(s): DEBLANC ET AL.

Phillip S. Lyren
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 13, 2008 appealing from the Office action mailed August 10, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5432873	Hosoya et al	7-1995
6624077	White	9-2003
6693736	Yoshimura et al	2-2004
2003/0118310	Steinberg et al.	6-2003

2001/0026670 Takizawa et al. 10-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 50 are rejected under 35 U.S.C. 102(b) as being anticipated by No. 5,432,873 to Hosoya et al.

Regarding Claim 1, Hosoya et al. describes a method of forming an optical communication path including forming a channel (8,11) in a planar layer in a first (7) and a second (10) substrates of a multilayered printed circuit board (shown in Figure 1), forming a portion of an optical path in the channel of the first and second substrates where the substrates are stacked together in the multi-layered printed circuit board, and coupling with a switch (9 with 13) the channel in the first substrate with the channel in the second substrate (see Figures 1-2 and Columns 6-7).

Regarding Claim 50, Hosoya et al. describes switching the switch between an opaque state that prevents the passage of an optical signal and a transparent state that permits the passage of an optical signal (see Column 7 Lines 1-25).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 4-5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. as applied to claim 1 above, and further in view of US Patent Application Publication No. 2003/0118310 to Steinberg et al.

Hosoya et al. does not describe the formation of the channels including the methods of the present claims. Steinberg et al. describes an alternate method of forming optical waveguides. At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the method of forming waveguides described by Steinberg et al. in forming the device of Hosoya et al. the motivation for doing so would have been to provide efficient optical coupling (see paragraph 0003 of Steinberg et al.)

Regarding Claim 2, Steinberg et al. describes creating the channel using a chemical process to remove planar layer material (see Paragraph 0025).

Regarding Claim 4, Steinberg et al. describes lithography defining a location of the optical path on the planar layer and etching the planar layer along the defined location of the optical path to create the channel (see Paragraph 0025).

Regarding Claim 5, Steinberg et al. describes filling the channel with an optical core medium (see Paragraph 0027).

Regarding Claim 9, Steinberg et al. describes depositing a cladding portion (22) within the channel and depositing a core medium (24) in the channel.

Regarding Claim 10, Steinberg et al. describes the cladding having a refractive index less than the core refractive index (see Figures 16-18(e)).

Regarding Claim 11, while Steinberg et al. does not specifically describe the cladding portion as reflective along a side adjacent the optical core medium, the cladding described by Steinberg et al. would inherently be reflective to allow for light-guiding along the core.

Claims 2-5 and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. as applied to claim 1 above, and further in view of US Patent No. 6,624,077 to White.

Hosoya et al. does not describe the formation of the channels including the methods of the present claims. White describes an alternate method of forming optical waveguides. At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the method of forming waveguides described by White in forming the device of Hosoya et al. The motivation for doing so would have been to provide efficient optical coupling (see Column 2 of White)

Regarding Claim 2, White describes creating the channel using a chemical process to remove planar layer material (see Figures 4A-4D).

Regarding Claims 3, Hosoya et al. and White do not specifically describe molding the planar layers with the channels. However, White does describe the planar layer formed from plastic (see Column 6 Line 65). It is well-known in the art that plastic may be molded into a desired shape. At the time of invention, it would have been obvious to one of ordinary skill in

the art to mold the layers described by White with channels. The motivation for doing so would have been to eliminate the need for additional manufacturing steps to create the channels.

Regarding Claim 4, White describes lithography defining a location of the optical path on the planar layer and etching the planar layer along the defined location of the optical path to create the channel (see Column 7 Lines 44-50).

Regarding Claim 5, White describes filling the channel with an optical core medium (see Figure 4E and Column 8 Line 65-Column 9 Line 15).

Regarding Claim 12, White describes the planar layer as a semiconductor (see Column 4 Line 50).

Regarding Claim 13, White describes the walls of the channel having a lower refractive index than the core medium (see Column 5 Lines 40-50).

Regarding Claim 14, White describes the optical path as noncylindrical (see Figure 1 and Column 2).

Regarding Claim 15, Hosoya et al. and White do not specifically describe forming an electrical trace on the substrate. However, it is well-known in the art to create electrical traces on semiconductor substrates. Therefore, at the time of invention, it would have been obvious to one of ordinary skill in the art to form an electrical trace on the semiconductor planar layer described by White. The motivation for doing so would have been to allow for connection to optoelectronic devices that may be optically connected to the optical communication path.

Claims 2, 6-9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. as applied to claim 1 above, and further in view of US Patent Application Publication No.2001/0026670 to Takizawa et al.

Hosoya et al. does not describe the formation of the channels including the methods of the present claims. Takizawa et al. describes an alternate method of forming optical waveguides. At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the method of forming waveguides described by Takizawa et al. in forming the device of Hosoya et al. The motivation for doing so would have been to provide efficient optical coupling (see Paragraphs 0005-0006 of Takizawa et al.).

Regarding Claim 2, Takizawa et al. describes creating the channel using a chemical process to remove planar layer material (see Paragraph 0059).

Regarding Claim 6, Takizawa et al. describes depositing a first cladding portion (3) in the channel, depositing an optical core medium (4) in the channel, and depositing a second cladding layer (5) over the optical core medium (see Figures 5-8 and Paragraphs 0058-0065).

Regarding Claims 7-8, Takizawa et al. does not specifically describe the cladding portions as having an index of refraction less than the index of refraction of the core, or as being optically reflective along a side adjacent to the optical core medium. However, claddings inherently possess such properties to guide light through an optical core.

Regarding Claim 9, Takizawa et al. describes depositing a cladding portion (3) in the channel and depositing an optical core medium (4) in the channel (see Figures 5-8 and Paragraphs 0058-0065).

Regarding Claim 14, Takizawa et al. describes the optical path as substantially noncylindrical (see Paragraph 0056).

Claims 16, 18-19 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over White in view of US Patent No. 6,693,736 to Yoshimura et al.

Regarding Claim 16, White describes a method of forming an optical communication path including providing a first substrate (206) with a planar layer having a channel face (213) defining a first channel (212), providing a second substrate with a planar layer (205) having a complementary channel face (214) defining a second channel (210), and placing the planar layers such that the first and second channels oppose each other to form a composite channel (210) defining the optical path in a multilayer printed circuit board (see Figure 2A). White does not describe providing vias through the planar layers to connect the channel with different optical pathways extending through different vertically stacked layers of the multi-layered printed circuit board. Yoshimura et al. describes a method of forming an optical communication path including providing channels (5, 11) that form an optical path and providing vias (9) through the layers forming the channel to connect different optical pathways and extending through different vertically stacked layers of the multi-layered printed circuit board (see Figures 1-2). At the time of in the invention, it would have been obvious to one of ordinary skill in the art to use the via structures of Yoshimura et al. with the pathway structure of White. The motivation for doing so would have been to allow for dense optical packaging.

Regarding Claim 18, White describes depositing the core medium within the first and second channels (see Figure 4E and Column 8 Line 65-Column 9 Line 15).

Regarding Claim 19, White describes filling the composite channel with an optical core medium (see Column 6 Lines 45-50, where the core medium is air).

Regarding Claim 21, White describes the first and second channels having semi-circular cross-sections (see Figures 2A, 3A and 3B).

Regarding Claim 22, White describes creating the channels using a chemical process applied to a planar layer (see Figures 4A-4D).

Regarding Claim 23, White and Yoshimura et al. do not specifically describe molding the planar layers with the channels. However, White does describe the planar layer formed from plastic (see Column 6 Line 65). It is well-known in the art that plastic may be molded into a desired shape. At the time of invention, it would have been obvious to one of ordinary skill in the art to mold the layers described by White with channels. The motivation for doing so would have been to eliminate the need for additional manufacturing steps to create the channels.

Claims 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over White and Yoshimura et al. as applied to claim 16 above, and further in view of Steinberg et al.

Regarding Claim 17, White and Yoshimura et al. do not specifically describe applying a reflective coating to the first and second planar layers. Steinberg describes a method of forming an optical communication path including applying a reflective coating (22) to a planar layer. At the time of invention, it would have been obvious to one of ordinary skill in the art to apply the reflective coating of Steinberg et al. to the planar layers of White et al. The motivation for doing so would have been to reduce signal leakage along the optical communication path.

Regarding Claim 20, White and Yoshimura et al. do not specifically describe applying a reflective coating to the first and second channels. Steinberg describes a method of forming an optical communication path including applying a reflective coating (22) to a channel. At the time of invention, it would have been obvious to one of ordinary skill in the art to apply the

reflective coating of Steinberg et al. to the channels of White et al. The motivation for doing so would have been to reduce signal leakage along the optical communication path.

(10) Response to Argument

Applicant argues that Hosoya et al. does not teach or suggest each element in Claim 1.

In particular, Applicant argues that Hosoya does not describe channels formed "within" substrates (Applicant's Appeal Brief, pages 10-11). As clearly shown in Figure 1 of Hosoya et al., waveguides (8 and 11) are made of material (shaded) in substrates (7 and 10, respectively).

Applicant argues that Hosoya et al. does not describe first and second substrates stacked together in a printed circuit board (Applicant's Appeal Brief, page 11). Figure 1 of Hosoya et al. shows the substrates (7 and 10) in a stacked configuration, forming a printed circuit board. It is multi-layered because it comprises multiple layers (6, 7, 9, and 10). It is a printed circuit board because the optical circuit (defined by waveguides 8 and 11) are printed thereon.

Applicant argues that layers 10 and 7 (Hosoya et al., Figure 1) are not substrates (Applicant's Appeal Brief, page12). However, "substrate" is a very broad term referring to any layer underneath another layer. In the case of Hosoya, layers 7 and 10 constitute substrates (while layer 10 is shown on top in the Figure of Hosoya, it may be considered that an air layer is above layer 10, or that the overall device may be considered upside-down where layer 10 would be under layer 9). Applicant argues that this is an improper interpretation of the term "substrate" because Hosoya et al. uses a different term for the layers (Applicant's Appeal Brief, page 12). However, the language that Hosoya et al. uses to describe a component does not limit the actual structural properties of that component and the manner in which they relate to the claims of the

present application. Layers 7 and 10 of Hosoya et al. constitute layers underneath of other layers. Therefore, the layers of Hosoya et al. are substrates. Applicant further urges that the term "substrate" be given its plain meaning consistent with the use of the term in the art (Applicant's Appeal Brief, pages 12-13). However, Applicant has advanced no definition which would constitute this "plain meaning". It should also be noted that in Applicant's invention, each of multiple layers (330, 340, 350, shown in figure 3) may be a substrate layer (Specification, page 4). Applicant does not provide a description of the properties for these substrates or how they are anything other than layers capable of having other layers stacked upon them, therefore, the layers of Hosoya et al. may also be considered substrates.

Applicant argues that Hosoya et al. does not teach or suggest each element in Claim 50.

Applicant argues that the switch of Hosoya et al. does not switch between an opaque state that prevents passage of an optical signal and a transparent state that permits passage of an optical signal (Applicant's Appeal Brief, pages 13). However, Hosoya et al. describes the switch having photochromic operation (column 3, line 64 – column 4, line 5) with a drastic change in refractive index (column 6, lines 10-15) that allows for either full passage or blockage of an optical signal (column 7, lines 6-23). Photochromic operation is the darkening of a material due to exposure to light (in the case of Hosoya et al., light from source 13 makes material of layer 9 darken). The fact that the photochromic effect used in Hosoya et al. allows for full passage or full blockage of the light signal means that the photochromic material switches between opaque and transparent states to either block or allow passage of light.

Applicant argues that Hosoya et al. and Steinberg do not teach or suggest each elements in Claims 2, 4-5, and 9-11.

Applicant reiterates the argument that Hosoya et al. fails to teach or suggest all elements of independent claim 1, while Steinberg fails to cure the alleged deficiencies. Hosoya et al. does teach all elements of independent claim 1, as described above.

Applicant argues that Hosoya et al. and White do not teach or suggest each element in Claims 2-5, and 12-15.

Applicant reiterates the argument that Hosoya et al. fails to teach or suggest all elements of independent claim 1, while White fails to cure the alleged deficiencies. Hosoya et al. does teach all elements of independent claim 1, as described above.

Applicant argues that Hosoya et al. and Takizawa do not teach or suggest each element in Claims 2, 6-9, and 14.

Applicant reiterates the argument that Hosoya et al. fails to teach or suggest all elements of independent claim 1, while Takizawa fails to cure the alleged deficiencies. Hosoya et al. does teach all elements of independent claim 1, as described above.

Applicant argues that White and Yoshimura et al. do not teach or suggest each element in Claims 16, 18-19, and 21-23.

In particular, Applicant argues that White does not describe channels formed "in" substrates (Applicant's Appeal Brief, page 14). As clearly shown in Figures 2A and 3A of White, channels (212 and 214) are formed in substrates (205 and 206).

Applicant argues that layers 205 and 206 of White are not substrates (Applicant's Appeal Brief, page 14). However, "substrate" is a very broad term referring to any layer underneath

another layer. In the case of White, layers 205 and 206 constitute substrates because they are layers stacked underneath of other layers. Applicant argues that this is an improper interpretation of the term "substrate" because White uses a different term for the layers (Applicant's Appeal Brief, pages 14 and 15-16). However, the language that White uses to describe a component does not limit the actual structural properties of that component and the manner in which they relate to the claims of the present application. Layers 205 and 206 of White constitute layers underneath of other layers. Therefore, the layers of White are substrates. Applicant further urges that the term "substrate" be given its plain meaning consistent with the use of the term in the art (Applicant's Appeal Brief, pages 15-16). However, Applicant has advanced no definition which would constitute this "plain meaning". It should also be noted that in Applicant's invention, each of multiple layers (330, 340, 350, shown in figure 3) may be a substrate layer (Specification, page 4). Applicant does not provide a description of the properties for these substrates or how they are anything other than layers capable of having other layers stacked upon them, therefore, the layers of White may also be considered substrates.

Applicant argues that White and Yoshimura et al. do not describe vias to "connect composite channels with a different optical pathway," (Applicants Appeal Brief, page 15) Applicant bases this argument on the contention that Yoshimura et al. does not describe composite channels, only channels in individual layers. However, White does describe a composite channel (210). The combination of Yoshimura et al. and White would result with a multilayer structure of optical paths having vias that connect the paths (similar to the structure of Yoshimura et al, figures 1-2), where the actual path structure is a composite channel structure (described by White, figure 2A).

Applicant argues that White, Yoshimura et al. and Steinberg do not teach or suggest each element in Claims 17 and 20.

Applicant reiterates the argument that White and Yoshimura et al. fail to teach or suggest all elements of independent claim 16, while Steinberg fails to cure the alleged deficiencies. White and Yoshimura et al. do teach all elements of independent claim 1, as described above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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